MODIS DATA STUDY
TEAM PRESENTATION

March 8, 1991

AGENDA

1. Action Items

2. Ocean Science Proposals, Phase I: Barton and Brown

3. Atmosphere Science Proposals, Phase I: Tanre

ACTION ITEMS:

12/21/90 [Watson Gregg and Al McKay]: Combine Earth Model reports into single document. Pursue 2 additional questions: 1) how important is the geoid/spheroid difference over the oceans, and 2) how important is the difference over land, considering the types of DEM/DTM's likely to be used? Coordinate with Al Fleig to distribute report. STATUS: A conversation has been held with Bob Evans (oceans), who said he preferred the geoid. A discussion with Chris Justice (land) was also held. He requested a short write-up on the issue be sent to himself and Muller and Barnsley so they could form an informed opinion. A short write-up was delivered to Daesoo Han on 1/7/91. Closed.

02/15/91 [Watson Gregg]: Make changes in the Earth Model reports and deliver to Al Fleig. Delivered to Al Fleig. STATUS: Closed.

02/15/91 [Team]: Review letter from Bill Browne requesting information on geo-location, orbit knowledge and control, and instrument pointing requirements for MODIS-T and determine answers (if known). Respond to B. Browne by February 21, 1991. Delivered to D. Han Feb. 22, 1991. STATUS: Closed.

03/06/91 [Watson Gregg] Prepare presentation on MODIS science data requirements for V. Salomonson to use at the Workshop on Data Compression in early April. Final form to be completed by March 29, 1991.

Investigator: Barton, Ian J.

Output Product(s):   (1) High resolution, fast delivery SST field (page 2,4)
                          (2) Weekly (archived) global SST field (p 2,4)
                          (3) Land surface temperature (LST) (p 3)
                          (4) Spectral surface emissivity (p 3)
                          (5) Comparisons with SST from other instruments (p 5)

  Resolution (Time):   (1) Not specified, available near real time (p 4)
                              (2) Weekly (p 4)

          (Space):   (1) 0.8 km (p 4)
                              (2) 0.25 x 0.25 or 0.5 x 0.5 degrees (p 7)
  Domain (Space):

  At Launch: (1) and (2) (p 7)

Post Launch: (3), (4) and (5)

MODIS-N/T: N (p 7)

Input Data:
  Spectral Bands Required:

  Resolution (Time):
            (Space):

**Ancillary Data Required
      (Type and Source):**   "some supporting buoy and ship measurements
                                   for validation" (page 4, 7)
                                   Supporting data from AMSU, AIRS, SCATT, ALT
                                   and others to refine SST measurement (p 5)

  Pre-Launch: **Size (Mbytes):**
  Post-Launch: **Size (Mbytes):**

Algorithm Complexity (floating point operations/scan):

Algorithm Memory Required (Mbytes):

Data Storage Required (Mbytes/scan):

Look-Up Tables Required:
  Size (Mbytes):

Lines of Code:

Language Expected:

Accessory Output Products (e.g., field experiment data):
  Pre-Launch: Size (Mbytes):
  Post-Launch: Size (Mbytes):

Expected Need of SDST (Pre- or Post-Launch):

Post-Launch Expected Growth:

Quality Assessments: Comparisons between EOS products and with other
                          systems (p 4, 5, 6, 7, 8)

Special Tilt Modes Required:

Notes: The Along Track Scanning Radiometer (ATSR) will be used to
            develop and refine techniques and operational algorithms for the
            derivation of Sea Surface Temperature (SST), Land Surface
            Temperature (LST), and associated products including spectral
            surface emissivity. (p 3) Emphasis is on development and
            refinement of techniques and algorithms

            CSIRO will provide in-house computing facilities. Require means
            of transferring data. (p 8)

Investigator: Brown, Otis B.

Output Product(s):   (1) Radiometer Calibration for channels 20, 22, 23, 29, 31 & 32 (p 3)
                          (2) Sea Surface Temperature (SST) algorithm based on 20, 22 & 23 (night-time, tropics) and 31 & 32 (mid-latitudes) (p 3)

Resolution (Time):   Weekly (p 3)

          (Space):   18 km

Domain (Space):

At Launch:

Post Launch:

MODIS-N/T: N (p 1)

Input Data:
  Spectral Bands Required: Channels 16 & 18 for aerosol detection (p 3)
                                  Channels 20, 22, 23, 29, 31 & 32 calibration (p 3)

  Resolution (Time):
            (Space):

Ancillary Data Required
      (Type and Source):   Adeos/NSCAT surface wind for glitter (EOSDIS) (p 2)
                                NOAA/AVHRR for prelaunch algorithm development (NOAA) (p 2)
                                ARGOS drifting buoy SST (NOAA) (p 3)
                                Ship of opportunity surface observations (NOAA)

  Pre-Launch: **Size (Mbytes):**
  Post-Launch: **Size (Mbytes):**

Algorithm Complexity (floating point operations/scan):

Algorithm Memory Required (Mbytes):

Data Storage Required (Mbytes/scan):

Look-Up Tables Required:
  Size (Mbytes):

Lines of Code:

Language Expected:

Accessory Output Products (e.g., field experiment data):
  Pre-Launch: Size (Mbytes):
  Post-Launch: Size (Mbytes):

Expected Need of SDST (Pre- or Post-Launch):

Post-Launch Expected Growth:

 uality Assessments: Comparisons between EOS products and with other
                            systems (p 4, 5, 6, 7, 8)

Special Tilt Modes Required:

Notes: PI involvement: 1) to develop and maintain algorithms for
           calibration of infrared bands needed for SST, and removal of
           atmospheric and surface effects, 2) to generate cloud detection
           algortihms, 3) to develop optimal assimilation codes for mapping
           SST retrievals, and 5) to validate SST observing system by in
           situ observations. (p 1)

Investigator: Tanre

Output Product(s):   (1) Mean aerosol radius and size dispersion
(2) Spectral aerosol optical thickness (with Kaufman)
(3) Aerosol mass loading (with Kaufman)
(4) Total precipitable water (with Kaufman)
(5) Land-leaving spectral reflectance (with Justice and Kaufman)
(6) Atmospherically corrected vegetation index (with Justice and Kaufman)

[Product lists generated since the proposals were submitted also include land-Leaving radiance, aerosol albedo, and IPAR as Tanre products.]

  Resolution (Time):

           (Space):

   Domain (Space):

At/Post-Launch: At-Launch

MODIS-N/T:

Input Data:

   Spectral Bands Required: MODIS-N bands 1, 2, 7, 17, 18, 19, 24, 30, and 31 mentioned.

   Resolution (Time):

              (Space):

Ancillary Data Required (Type and Source):

    Pre-Launch: **Size (Mbytes):**
      Landsat/TM
      NOAA/AVHRR

    Post-Launch: **Size (Mbytes):**
      MISR
      EOSP

Algorithm Complexity (floating point operations/scan):

Algorithm Memory Required (Mbytes):

Data Storage Required (Mbytes/scan):

Look-Up Tables Required:

  Size (Mbytes):

Lines of Code:

Language Expected:

Accessory Output Products (e.g., field experiment data):

    Pre-Launch: **Size (Mbytes):**

    Post-Launch: **Size (Mbytes):**
      Field validation planned

Expected Need of SDST (Pre- or Post-Launch):

Post-Launch Expected Growth:

Quality Assessments:

Special Tilt Modes Required:

Note: Tanre plans to supply a number of algorithms that may be used by other Team Members. The list includes:

(1) A simulation code that generates the satellite signal in the solar spectral bands of MODIS for actual observation conditions.

(2) A fast and accurate algorithm that accounts for molecular effects.

(3) For land surfaces, an algorithm to provide routine atmospheric corrections.

(4) For ocean areas, an algorithm to retrieve ocean color and aerosol reflectance.

(5) For land surfaces, an algorithm for finding invariant pixels and for retrieving spectral aerosol optical thickness.

(6) An inversion algorithm to estimate aerosol size distribution (mean radius and dispersion) from spectral satellite reflectances.

MODIS Team Member Proposal
Data Requirements Form

Investigator: Tanre

Output Product(s): (1) Aerosol climatology

  Resolution (Time):

       (Space):

  Domain (Space): Global

At/Post-Launch: Post-Launch

MODIS-N/T:

Input Data:

  Spectral Bands Required:

  Resolution (Time):

       (Space):

Ancillary Data Required (Type and Source):

  Pre-Launch: **Size (Mbytes):**

  Post-Launch: **Size (Mbytes):**

Algorithm Complexity (floating point operations/scan):

Algorithm Memory Required (Mbytes):

Data Storage Required (Mbytes/scan):

Look-Up Tables Required:

   Size (Mbytes):

Lines of Code:

Language Expected:

Accessory Output Products (e.g., field experiment data):

   Pre-Launch: Size (Mbytes):

   Post-Launch: Size (Mbytes):
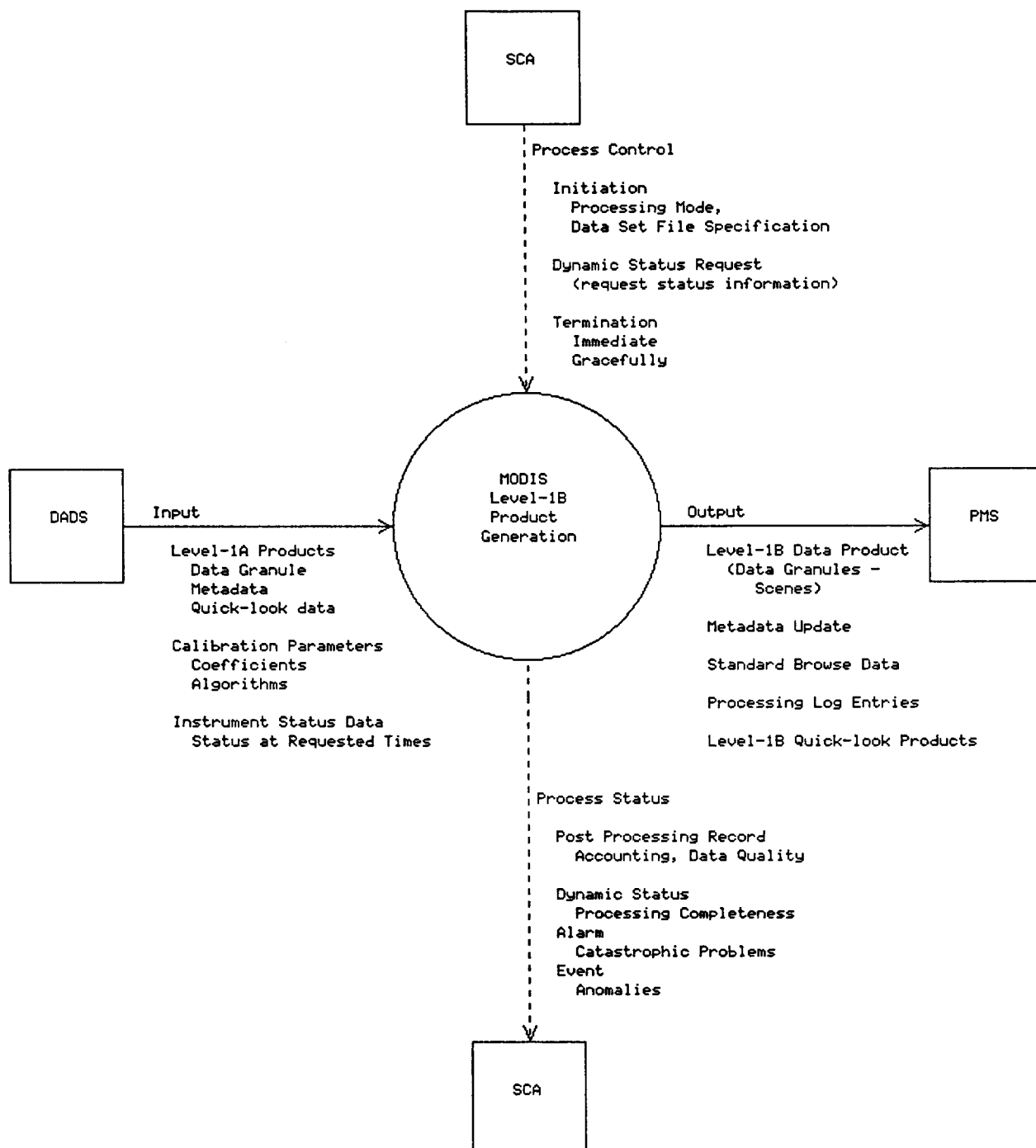
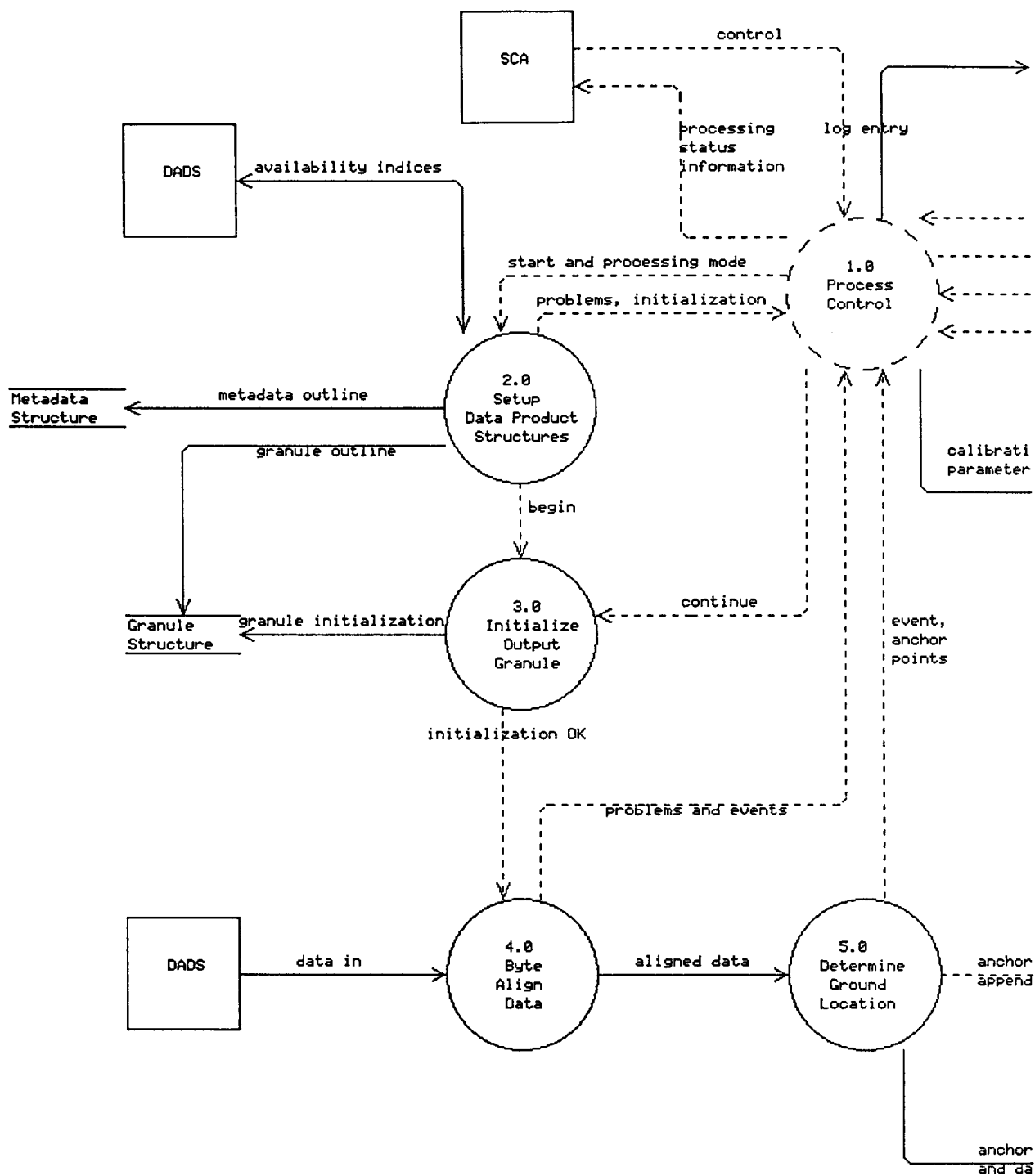Expected Need of SDST (Pre- or Post-Launch):

Post-Launch Expected Growth:

Quality Assessments:

Special Tilt Modes Required:

APPENDIX

SCA

Process Control

   Initiation
     Processing Mode,
     Data Set File Specification

   Dynamic Status Request
     (request status information)

   Termination
     Immediate
     Gracefully

DADS

Input

Level-1A Products
   Data Granule
   Metadata
   Quick-look data

Calibration Parameters
   Coefficients
   Algorithms

Instrument Status Data
   Status at Requested Times

MODIS
Level-1B
Product
Generation

Output

Level-1B Data Product
   (Data Granules –
     Scenes)

Metadata Update

Standard Browse Data

Processing Log Entries

Level-1B Quick-look Products

PMS

Process Status

   Post Processing Record
     Accounting, Data Quality

   Dynamic Status
     Processing Completeness
   Alarm
     Catastrophic Problems
   Event
     Anomalies

SCA

```
Project : \ECPLUS\MODIS-1B\
Chart : level-a
Filename : level-a.trg
Last Modified : 03-07-1991
```

SCA

control

DADS

availability indices

processing
status
information

log entry

1.0
Process
Control

start and processing mode

problems, initialization

2.0
Setup
Data Product
Structures

Metadata
Structure

metadata outline

granule outline

calibrati
parameter

begin

Granule
Structure

granule initialization

3.0
Initialize
Output
Granule

continue

event,
anchor
points

initialization OK

problems and events

DADS

data in

4.0
Byte
Align
Data

aligned data

5.0
Determine
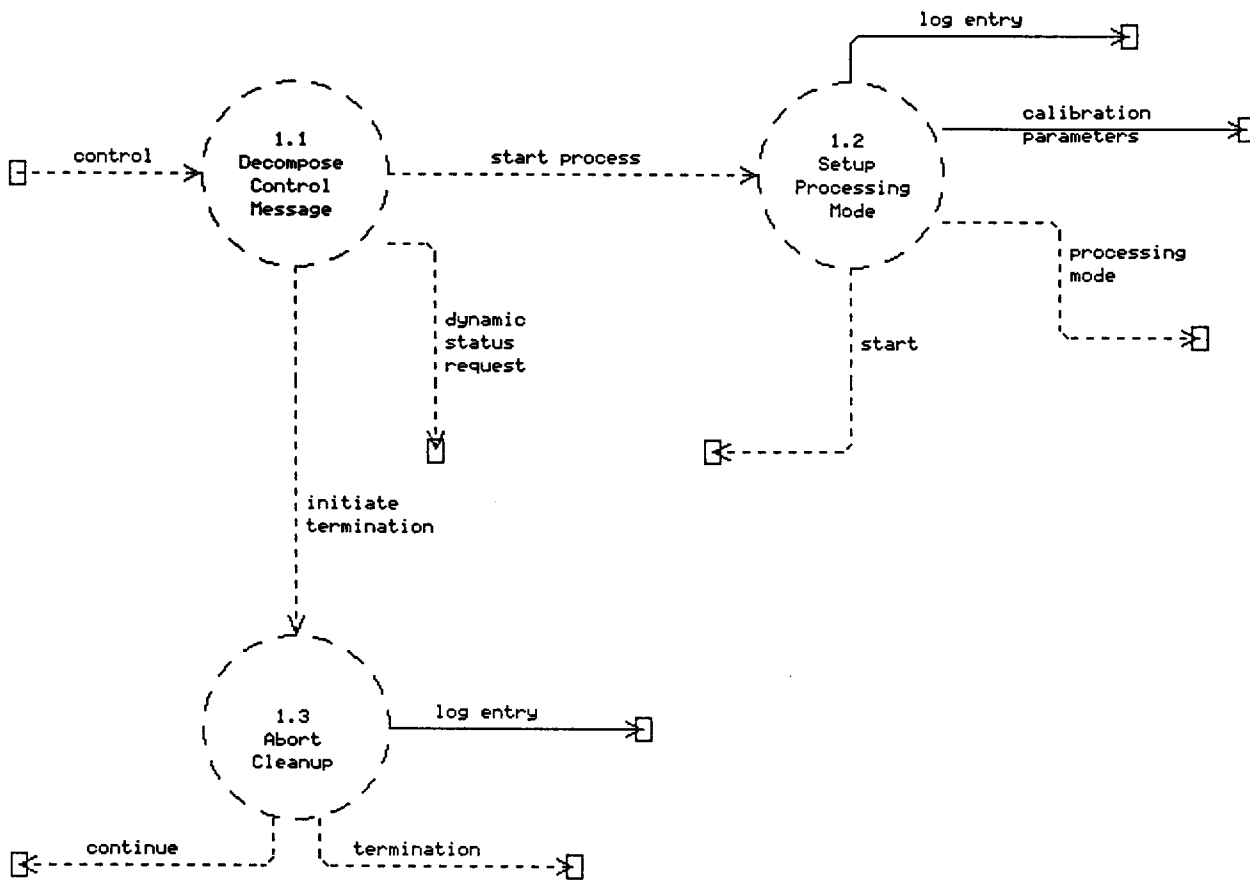Ground
Location

anchor
append

anchor
and da

Project : \ECPLUS\MODIS-1B\
Chart : level-b1
Filename : level-b1.trg
Last Modified : 03-07-1991

Project : \ECPLUS\MODIS-1B\
Chart : level-b2
Filename : level-b2.trg
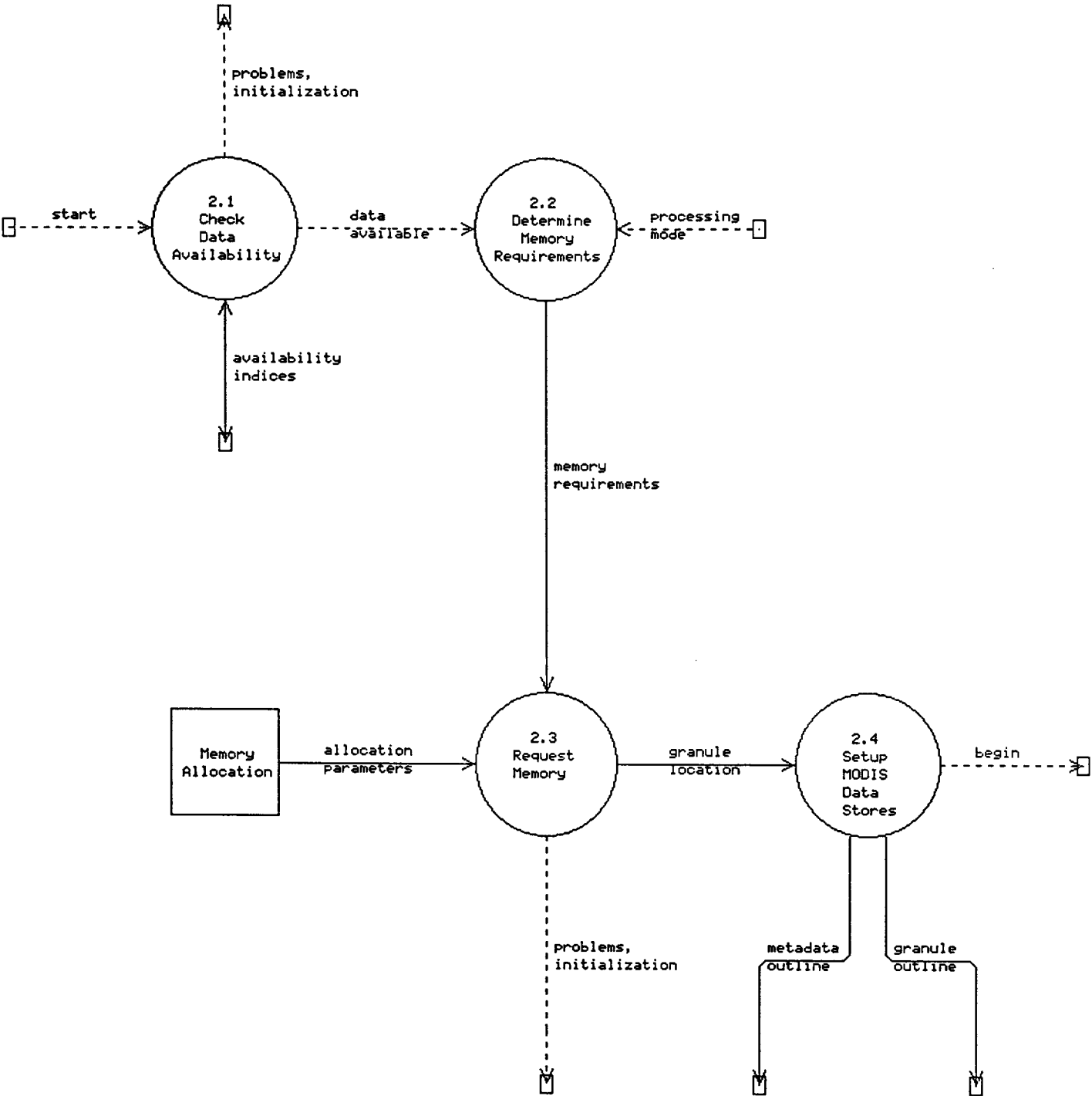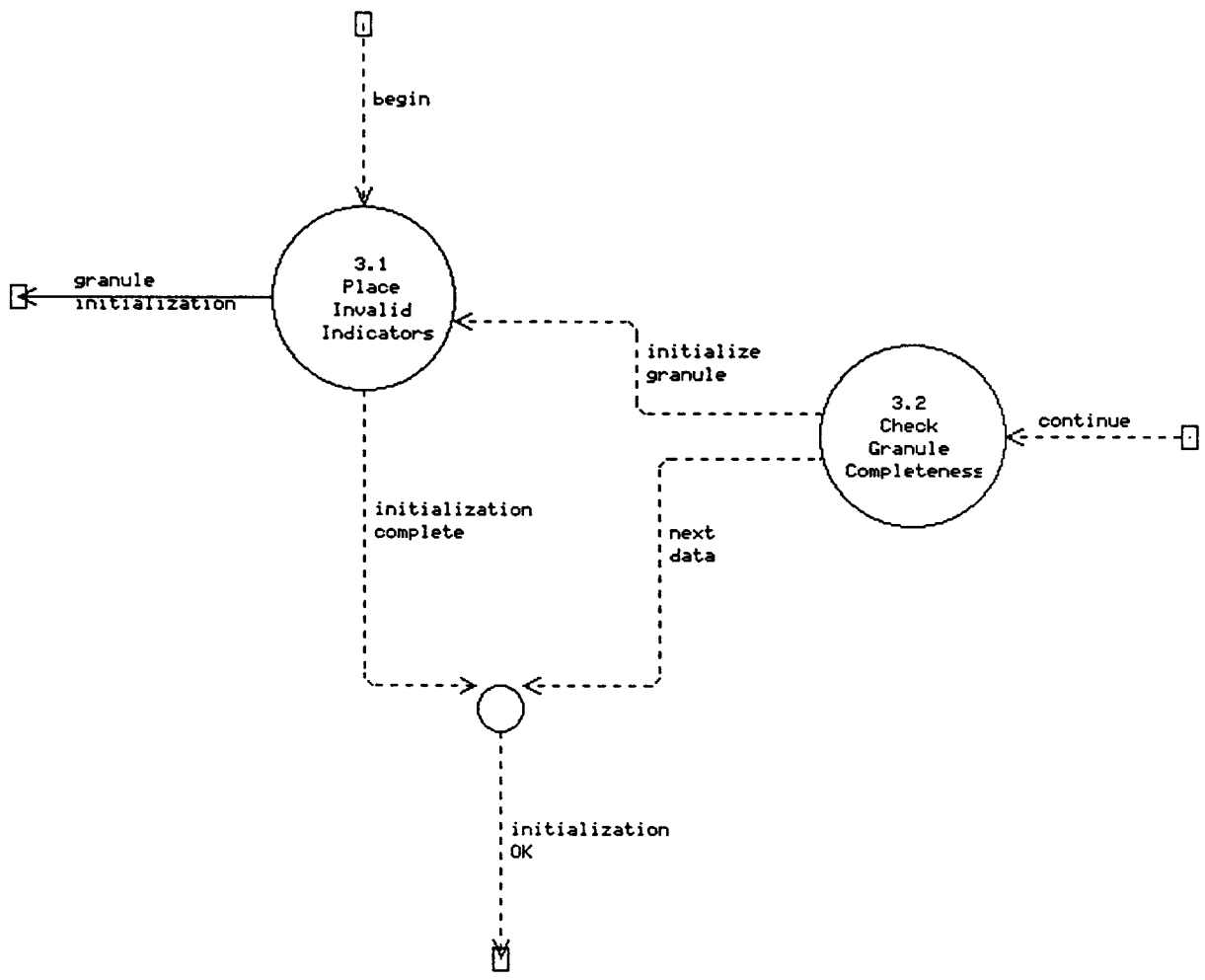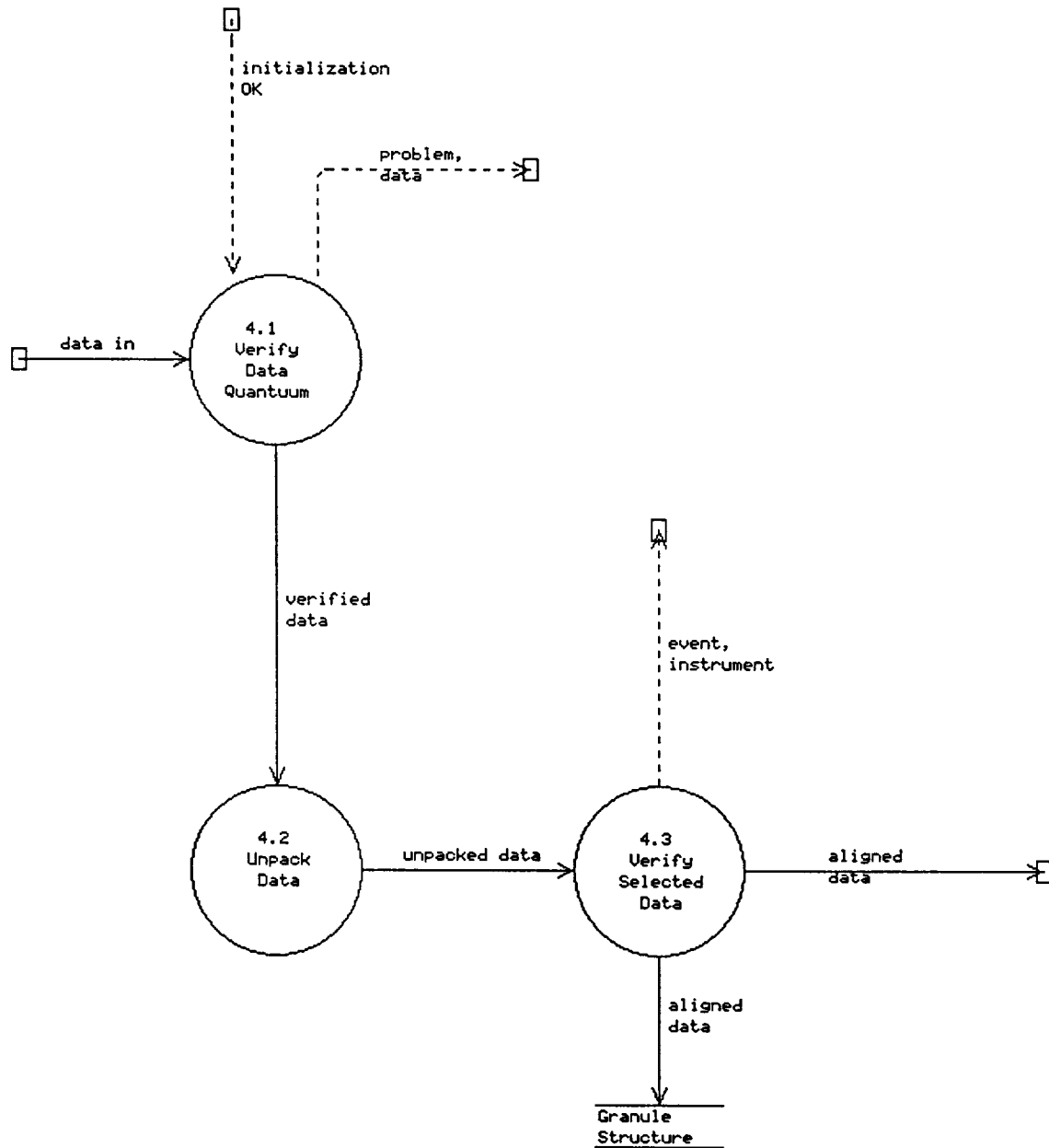Last Modified : 03-07-1991

Project : \ECPLUS\MODIS-1B\
Chart : level-b3
Filename : level-b3.trg
Last Modified : 03-07-1991

begin

3.1
Place
Invalid
Indicators

granule
initialization

initialize
granule

3.2
Check
Granule
Completeness

continue

initialization
complete

next
data

initialization
OK
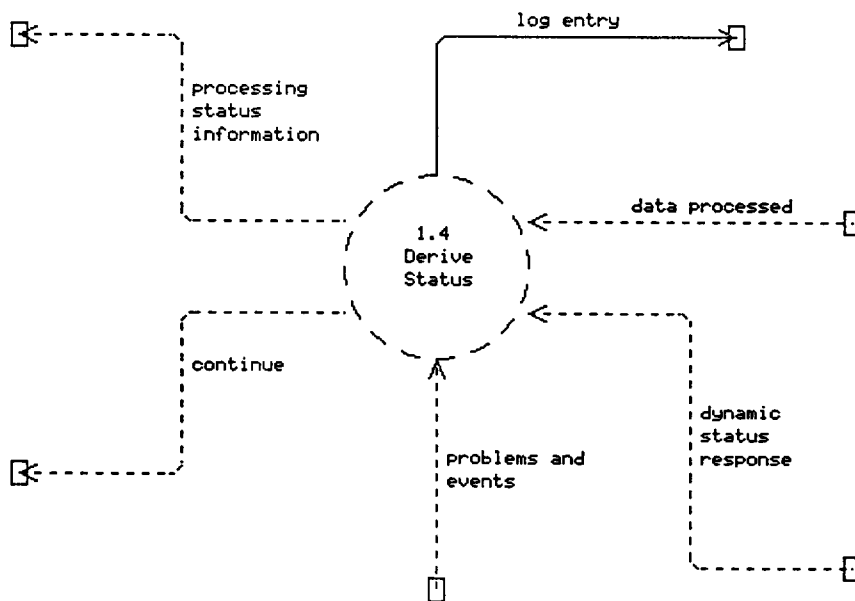
Project : \ECPLUS\MODIS-1B\
Chart : level-b4
Filename : level-b4.trg
Last Modified : 03-07-1991

initialization
OK

problem,
data

data in

4.1
Verify
Data
Quantuum

verified
data

event,
instrument

4.2
Unpack
Data

unpacked data

4.3
Verify
Selected
Data

aligned
data

aligned
data

Granule
Structure

Project : \ECPLUS\MODIS-1B\
Chart : level-b5
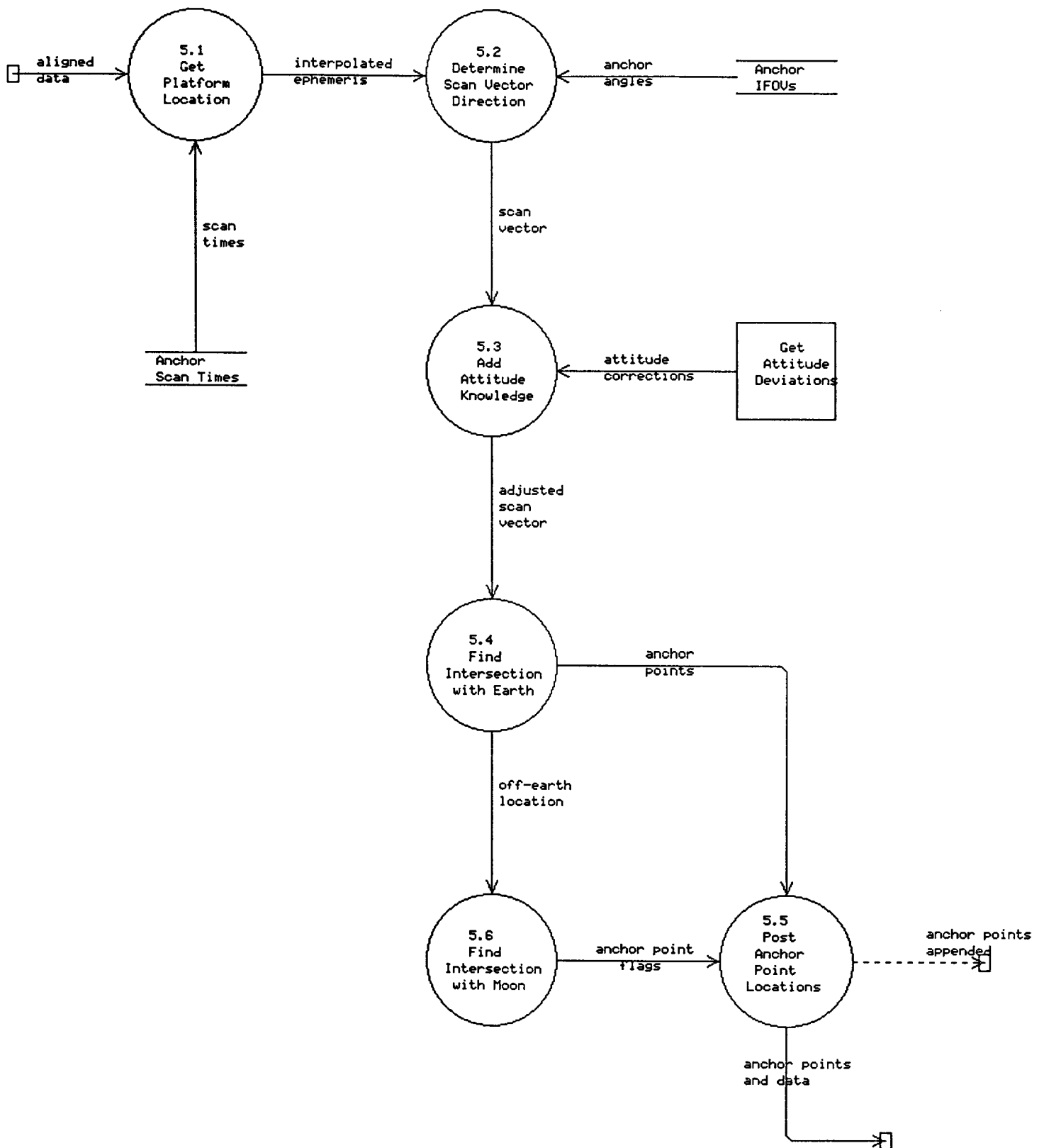Filename : level-b5.trg
Last Modified : 03-07-1991

aligned
data

5.1
Get
Platform
Location

interpolated
ephemeris

5.2
Determine
Scan Vector
Direction

anchor
angles

Anchor
IFOVs

scan
times

Anchor
Scan Times

scan
vector

5.3
Add
Attitude
Knowledge

attitude
corrections

Get
Attitude
Deviations

adjusted
scan
vector

5.4
Find
Intersection
with Earth

anchor
points

off-earth
location

5.6
Find
Intersection
with Moon

anchor point
flags

5.5
Post
Anchor
Point
Locations

anchor points
appended

anchor points
and data

Project : \ECPLUS\MODIS-1B\
Chart : level-b7
Filename : level-b7.trg
Last Modified : 03-07-1991